

Happy Memories: A Study on if Reliving Happy Memories Makes Islanders Perform Better on a Test

Stats 67 Final Project

- 1. What is your study question?** Do Islanders who relive happy memories before a test perform better than Islanders who do not?
- 2. What do you believe the outcome will be (answers before collecting data)?** I Believe that the Islanders who relive happy memories before a test will perform better than those who do not.
- 3. What is your population of interest?** The population of interest is all Islanders age five and up. This age range was chosen because Islanders in this age range are likely to take tests, and very young children probably will not be.
- 4. How did you choose the Islanders for your study sample?** The participants have to be representative of the entire Island, so I tried to make sure all Islanders of all ages, cities and genders were included in the sample. Thirty different times, two Islanders (each of separate households but the same gender and similar age) from 30 cities (picked so that approximately every city in each area of the Island was chosen) were picked randomly (I just clicked on a random house) and from there, the two were selected to be either in the control group (0) or treatment group (1). Random.org's random number generator was used with the following settings to pick which Islander went to which group:

Generate 1 random integers (maximum 10,000).

Each integer should have a value between

0 and 1 (both inclusive; limits $\pm 1,000,000,000$).

The population parameters for the Island are unknown. The samples were obtained from simple random sampling, the data in the samples are independent (chosen from different households/cities), both from each other and the other sample. As the sample size for each group is less than 10% of the total population I know that the results from a two-sample T-test will be valid and that the results can be extrapolated to the population.

5. How many Islanders are in your study? I wanted to perform a T-Test, so in order to do so both samples must have relatively normally distributed data. As the population's distribution is unknown, I made sure that the Central Limit Theorem could be applied to my samples by making sure each sample had a size of $n = 30$, making their distributions approximately normal. In total, 60 Islanders were in my study.

6. How did you decide on the study size? I wanted to get a representative sample of the population and I wanted both the control and treatment groups' data to be distributed approximately normally so a T-test could be performed. In order to do this, I had to pick a somewhat large sample size of $n = 30$ for each group.

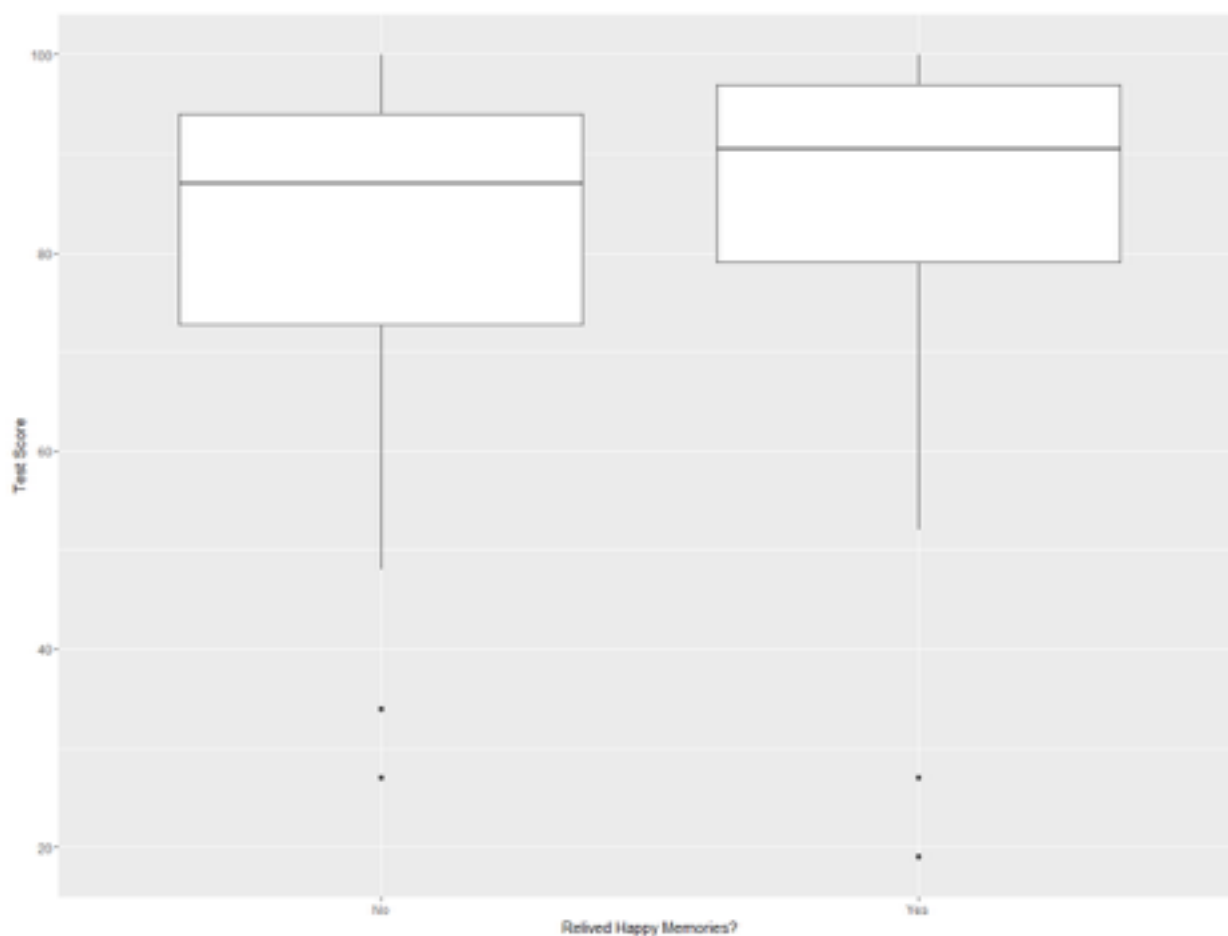
7. What did you measure? How did you measure it? Did you give any treatment? In what order?

I asked each participant to take a reading comprehension test and measured their score at the end (a number between 0 and 100). For participants in the treatment group, I asked them to relive happy memories a few minutes before they took the test. The results from the test were then recorded.

8. Is this an observational study or an experiment? Because I asked the Islanders in the study to do a task (take a test and possibly relive happy memories), this is an experiment.

9. Display your data using an appropriate statistical graphic.

Side-by-Side Boxplots for Test Scores of Islanders who Either Relived Happy Memories or Did Not



Note: The two outliers for both groups are tests scores of very young children who understandably would not perform as well as adults. These will be kept when calculating the statistics.

10. Provide appropriate summary statistics for your data.

Treatment Group (Memories):

Mean: 83.97

Median: 90.50

Standard Deviation: 19.928

Number of Participants: 30

Control Group (No Memories):

Mean: 80.13

Median: 87.00

Standard Deviation: 19.590

Number of Participants: 30

$$\text{Xbar(Memories)} - \text{Xbar(None)} = 3.84$$

11. Perform a hypothesis test or create a confidence interval. What statistical procedure did you use? What were the results?

Ho: $\mu(\text{memories}) - \mu(\text{none}) = 0$ (Reliving happy memories before a test has no effect on test score)

Ha: $\mu(\text{memories}) - \mu(\text{none}) > 0$ (Reliving happy memories before a test increases test score)

We are observing one numeric outcome (test score) measured on 2 different groups (treatment group, control group) and seeing if the treatment produces a higher test score, so a 1 sided T-Test will be used on the variables Test Score (continuous variable) and Memories/ No (categorical variable). With a significance level $\alpha = 0.05$ a 1-sided T-Test was performed in R (see Appendix for code) and the following results were obtained:

$$t = 0.75134, \text{ p-value} = 0.2277$$

As the p-value is greater than our significance level we fail to reject the null hypothesis. In other words, there is not sufficient evidence to support the theory that reliving happy memories before a test increases test score for Islanders.

12. Write an abstract-style paragraph summarizing your study and its findings.

A randomized controlled experiment of Islanders ages 5 to 135 was performed to see if reliving happy memories before a comprehension test will increase test score. 60 participants who were a representative sample of the entire population of Islanders ages 5 to 135 were randomly selected to be in the control group or the treatment group for the experiment. Both groups were asked to take a 10-minute reading comprehension test and their scores were then recorded. Participants in the treatment group were asked to relive happy memories for a minute before they took the test. The treatment group had an average test score of 83.97 out of 100. The control group had an average test score of 80.13 out of 100. A one-sided T-Test was performed on the results of the experiment and a p-value of 0.2277 was obtained. These results show that there is not sufficient evidence to support the theory that reliving happy memories before a test increases test score for Islanders.

Appendix

R Code:

```
library("ggplot2")
```

```
#PROBLEM 9
```

```
ggplot(Project) + geom_boxplot(aes(y=Project$Test.Score, x=Project$Memories)) +  
xlab("Relived Happy Memories?") + ylab("Test Score")
```

```
#PROBLEM 10
```

```
summary(Treatment$Test.Score)
```

```
sd(Treatment$Test.Score)
```

```
summary(Control$Test.Score)
```

```
sd(Control$Test.Score)
```

```
#PROBLEM 11
```

```
t.test(Treatment$Test.Score, Control$Test.Score, alternative = "greater", mu = 0, paired =  
FALSE, var.equal = TRUE, conf.level = 0.95)
```